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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/625,546	07/24/2003	Yutaka Hirose	YMOR:294	8197

6160 7590 03/29/2006  
PARKHURST & WENDEL, L.L.P.  
1421 PRINCE STREET  
SUITE 210  
ALEXANDRIA, VA 22314-2805

EXAMINER

PAREKH, NITIN

ART UNIT	PAPER NUMBER
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2811

DATE MAILED: 03/29/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

32

<b>Office Action Summary</b>	<b>Application No.</b> 10/625,546	<b>Applicant(s)</b> HIROSE ET AL.	
	<b>Examiner</b> Nitin Parekh	<b>Art Unit</b> 2811	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 20 January 2006.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-4 is/are pending in the application.
- 4a) Of the above claim(s) 4 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-3 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 07-24-03 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All    b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

## **DETAILED ACTION**

### ***Request for Continued Examination***

1. A request for continued examination (RCE) under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 01-20-06 has been entered. An action on the RCE follows.

### ***Claim Rejections - 35 USC § 103***

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 1-3 are rejected under 35 U.S.C. 103(a) as being unpatentable over Herner et al. (US Pat. 2003/0030147) in view of Nakamura et al. (US Pat. 6204512) and admitted prior art (APA).

Regarding claims 1-3, Herner et al. disclose a contact formation method comprising:

- forming a composite film comprising silicon (Si) and titanium (Ti) on a surface layer of a semiconductor region (see 28 and 30 respectively on the region 12 in

Art Unit: 2811

Fig. 3; sections 0021-0023) of a semiconductor material including a Group III nitride semiconductor (see section 0039)

- the Si and Ti films being formed in the order of depositing Si followed by Ti (sections 0022, 0023 and 0028), and
- heat treating/annealing the films and the semiconductor layer at a temperature of about 800 deg. C (section 0025)

(Fig. 2-5; sections 0022-0039; pp. 1-4).

Herner et al. further disclose semiconductor material layer comprising GaAs, GaN, etc. having n-type diffusing dopant in the formation of the contacts/ohmic contacts (see sections 0039 and 0040) and such contacts not only being limited to a three dimensional memory array but also being used for a wide range of IC applications/devices (section 045), but Herner et al. fail to teach:

- a) the contacts including source and drain contacts of a field effect transistor (FET)
- b) the semiconductor material layer having diffusing Si as a dopant.

a) APA teaches using Group III nitride semiconductor in a transistor comprising conventional source and drain contacts (see specification pp. 1 and 2).

b) Nakamura et al. teach forming ohmic contacts using semiconductor material layer such as n-type GaN (see 12 in Fig. 6) having conventional Si as a dopant (Col. 5, lines 17-24; Col. 11, lines 24-30).

Art Unit: 2811

It would have been obvious to a person of ordinary skill in the art at the time invention was made to incorporate the semiconductor material layer having diffusing Si as a dopant to form source and drain contacts in the FET as taught by APA and Nakamura et al. so that the desired device applications, ohmic characteristics, and electrical performance can be achieved in Herner et al's contacts.

### ***Response to Arguments***

4. Applicant's arguments filed on 08-04-05 have been fully considered but they are not persuasive.

A. Applicant contends that it is not clear from the references that Si diffuses as a dopant and furthermore, in the present invention Si generated in excess is removed by formation of titanium silicate.

However, as explained in the rejections above, Nakamura et al. clearly teach Si as a dopant in n-type GaN semiconductor layer under heat treatment to form contacts/ohmic contacts (Col. 5, lines 17-24; Col. 11, lines 24-30; col. 5, 11 and 12). Limitations as recited in the amended claims do not include formation of titanium silicate to remove excess Si.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Nitin Parekh whose telephone number is 571-272-1663. The examiner can normally be reached on 09:00AM-05:30PM.

Art Unit: 2811

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Eddie Lee can be reached on 571-272-1732. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAN or Public PAG. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAG system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0956.

NP

03-26-06

  
NITIN PAREKH

PRIMARY EXAMINER

TECHNOLOGY CENTER 2800